REMARKS

Claims 1-17 are pending in this application.

Claim 1 is an independent claim from which clams 2-4 depend directly or through intervening claims.

Claim 5 is an independent claim from which claims 6-16 depend either directly or through intervening claims.

Claims 17 and18 are new independent claims.

Foreign Priority

The indication that the foreign priority documents have been received and placed in the file is noted.

Brief Summary of the Invention

The present invention is directed to a semiconductor device that is thin and can be packaged with enhanced resistance to breaking.

In the prior art, for example, as shown in Figures 5a and 5b the device can bend when it receives an external force caused, for example, when the device in which it is included is dropped or receives an external force. The dropping or applying an external force for example causes a connection with a printed circuit board to break thus disconnecting the device. See for example the description of the background art on pages 1 and 2 of the specification.

With the present device there is structure and a method for curing the problem of the prior art as set forth in the specification. Basically, the structure is thin and has a mirror surface which cures problems of the

semiconductor cracking when force is applied. The structure and method are set forth in the context claimed.

Reply to Rejections

Claims 1-2 and 4-5 are rejected under 35 U.S.C. §102(e) as being anticipated by Jiang et al. (U.S. Patent 6,184,064). This rejection is traversed.

While Jiang et al. may disclose texturing the backside surface of the semiconductor component to create an uneven surface as explained in the rejection, this is not what is claimed. That is directing attention to base claim 1, which in the context claimed has a surface opposite the surface provided with said external electrode, is abrased with a mirror finish surface. In fact, it is important that this be, for example, a mirror finished surface and not be a surface that is uneven or has scratches. See for example, page 6, line 31 to page 7, line 3 of the specification which states as follows:

> Note that the wafer may be ground before it is abrased. If it is roughly ground the whole process time can be reduced. It should be noted, however, that after it is ground it must be abrased and thus, mirror-finished, since grinding wafer one often results in the wafer having its process surface with small with small scratches and wafer one thus reduced in thickness may crack at such scratches. The wafer experiences force exerted to bend it.

Thus, clearly the abrased mirror-finished surface is not shown or suggested in the reference. The reference requires that there be an uneven surface which would not meet the features the present claims. While the term abrased has been used, by definition abrasing, does not necessarily result in

an uneven surface. In fact, in the claim the abrasing provides the mirror-finish.

The above comments are also applicable to method claim 5 which provides "abrasing to a mirror-finish" which is not shown or suggested in the reference.

With respect to dependent claims 2 and 4, these claims are considered patentable at least for the same reasons as their base and intervening claims.

For the reasons set forth above the Examiner is requested to reconsider and withdraw the rejection of the claims under 35 U.S.C. §102.

Second Rejection

Claims 6-8 were rejected under 35 U.S.C. §103(a) as being unpatentable over Jiang et al.

With respect to claim 6 as advance in the reply to the first rejection Jiang et al. does not suggest the method of claim 5 and thus a rejection under 35 U.S.C. §103(a) is not viable.

Regarding claims 6-8 no evidence has been supplied to support this rejection. Proof is requested, see MPEP §2144.03. Additionally to provide a flatness to improve adhesion does not provide the result set forth in the claims.

For the reasons set forth above, the Examiner is requested to reconsider and withdraw the rejection of the claims under 35 U.S.C. §103.

Third Rejection

Claim 3 was rejected under 35 U.S.C. §103(a) as being unpatentable over Jiang et al. in view of Horiuchi et al. (U.S. Patent 6,242,799). This rejection is traversed.

Claim 3 is dependent on claim 2/1. As set forth above with respect to the Jiang et al. reference, this reference does not suggest the structure in the context claimed of claims 1 and 2. The addition of Horiuchi et al. does not cure the inherent deficiencies of the rejection based on Jiang et al. and thus a *Prima Facie* case obviousness does not exist.

A new claim 17 has been added. This claim is a structure claim and provides a second surface which is mirror finished which is opposite to said first surface. The reference applied either alone or in combination do not suggest this structure which provides for the improvement over the prior art as shown for example in Figures 5a and 5b.

For the reasons set forth above, the Examiner is requested to reconsider and withdraw the rejection of the claims under 35 U.S.C. §103.

Fourth Rejection

Claims 9-12 are rejected under 35 U.S.C. §103(a) as being unpatentable over Jiang et al. in view of Sakaguchi et al. (U.S. Patent 6,150,194). This rejection is traversed.

These claims are dependent on base claims 5 either directly or through intervening claims. As set forth above Jiang et al. does not show or suggest the method of claim 5. The addition of Sakaguchi et al does not cure the inherent

deficiencies of the rejection based on Jiang et al. and thus there is no *Prima Facie* case of obviousness.

For the reasons set forth above the Examiner is requested to reconsider and withdraw the rejection of the claims under 35 U.S.C. §103.

Fifth Rejection

Claims 13-16 were rejected under 35 U.S.C. §103(a) as being unpatentable over Jiang et al. in view of Takahashi et al. (U.S. Patent 6,153,448). This rejection is traversed.

Claims 13-16 are dependent on claim 5 directly or through intervening claims. For the reasons advance above in response to the rejection of claim 5, Jiang et al. does not suggest the method claim. The addition of Takahashi et al. does not cure the inherent deficiencies of a rejection based on Jiang et al. and thus a *Prima Facie* case of obviousness does not exist.

For the reasons set forth above the Examiner is requested to reconsider and withdraw the rejection under 35 U.S.C. §103.

New Claims

A new claim 17 has been added. This claim is a structure claim and provides a second surface which is mirror finished which is opposite to said first surface. The reference applied either alone or in combination do not suggest this structure which provides for the improvement over the prior art as shown for example in Figures 5a and 5b.

Also a new claim 18 has been added. This claim is directed to a method of manufacturing a semiconductor device with the particular steps set forth in the claims. This method is not disclosed or suggested by the references applied. For example, there is no reference showing the mirror-finish surface in the context claimed of new claim 18.

Summary with Additional Comments

As described in Jiang, a silicon chip having a back surface roughened is mounted in a semiconductor device to provide enhanced contact between the resin constituting the semiconductor device and the chip and thereby allowing the entire package to be more resistant to moisture

In the present invention in the context claimed, a chip has a back surface with a mirror surface and thus the chip is reduced in thickness to allow a semiconductor device to be more flexible and the "mirror surface" prevents breaking due, for example, cracking due to roughness. When the semiconductor device is mounted on a printed circuit board, electrodes between the device and the PCB can be connected together more reliably.

When small and lightweight electronic equipment such as a cellular phone is dropped, it is impinged on or its casing flexes and thus experiences a physical load and a stress often results. Such a load significantly bends a PCB. When the electronic equipment is dropped and impinged on, in particular, its deformation as it bends occurs during a significantly short period of several microseconds. If it includes a semiconductor less flexible in

structure as is conventional, distortion introduced by bending stress is exactly applied to a connect arranged in an array.

In the present invention, a semiconductor itself is structured to be more bendable to alleviate distortion exerted to a connect. This can protect the connect from damage and thus reliability.

The "abrading with a mirror surface" noted is provided in the present invention for a purpose different from that of abrading in Jiang. Jiang abrades a back surface of a chip to roughen it, whereas the present invention does so to reduce the chip in thickness. Roughening the back surface of the chip, as disclosed in Jiang, would be an inconvenience in the present invention, as such would provide a point at which the chip starts to crack in response to a bending-stress. Therefore, to achieve the object of the present invention, a chip needs to have a back surface mirror-finished. This is described also in the specification noted above.

Conclusion

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Elliot Goldberg (Reg. No. 33,347) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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CG/EAG/kdb/kss
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Attachment: Version with Markings to Show Changes Made

(Rev. 02/20/02)

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims have been amended as follows:

1. (Amended) A semiconductor device [including]comprising:

a semiconductor substrate having a surface provided with an external connection electrode and;

a surface opposite that with said external connection electrode, abrased with a mirror finish and reinforced with a back-surface reinforcement member.

5. (Amended) A method of manufacturing a semiconductor device comprising the steps of:

abrasing to a mirror finish a surface of a semiconductor substrate opposite to a surface thereof having an external connection electrode; and

applying resin on said surface abrased.

Claims 17 and 18 have been added.